



Hazard Management in Chemical Clusters

Safety & clusters

Antea Group vakgroep Save
1 oktober 2021

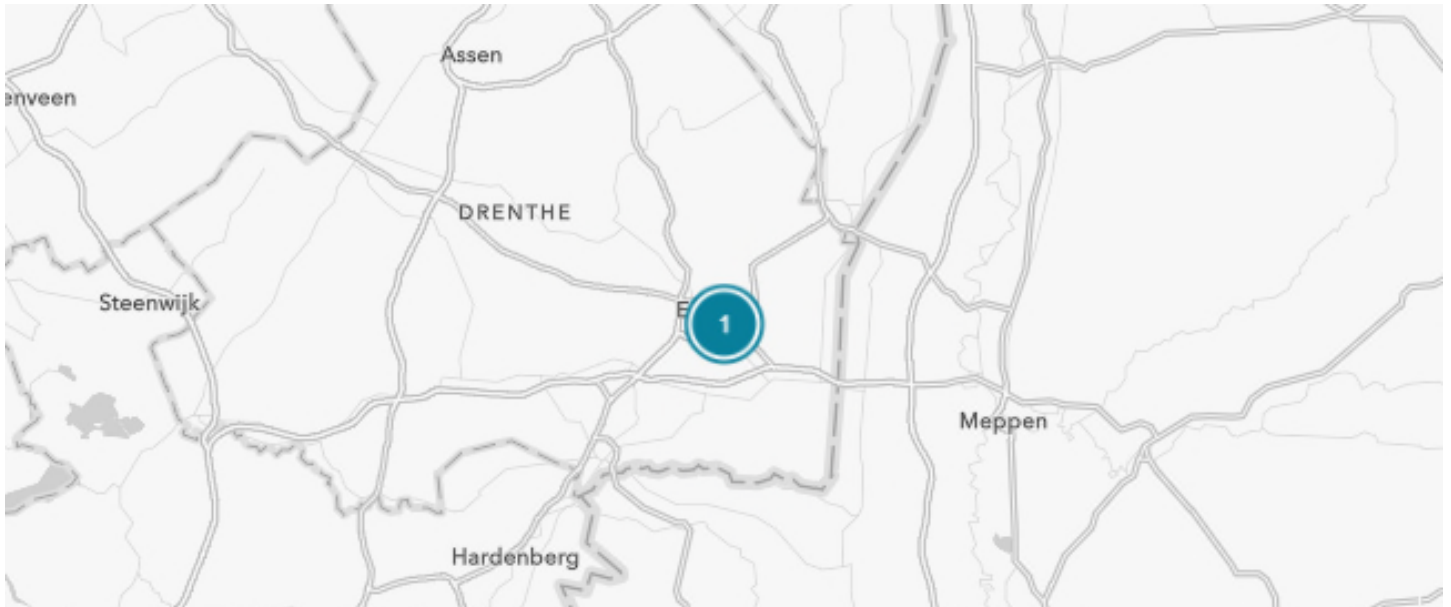


Introduction

Chemical clusters provide **scaling benefits**, but also require special attention considering **interactions of hazards** from fixed and mobile installations. There is an extra need for insight and exchange of information on hazard scenario's and domino effects.

Also changing climate effects need to be considered as a possible hazard to personnel and installations.

Chemical cluster locations

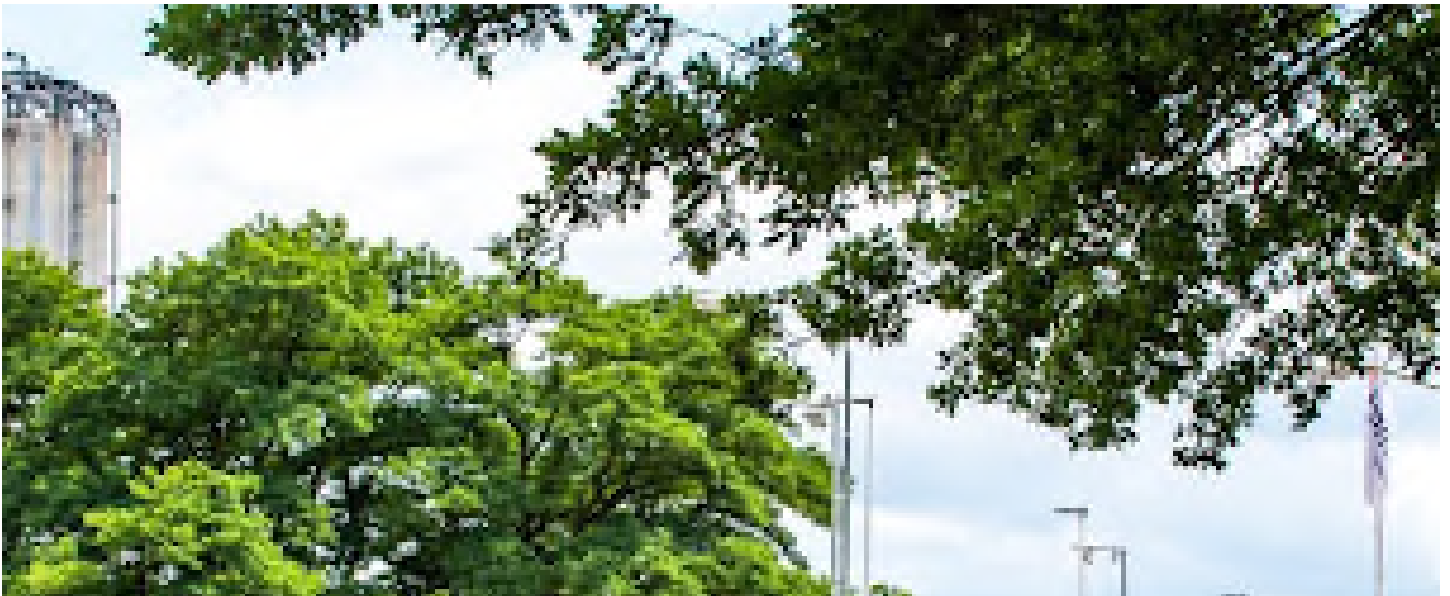


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GETEC PARK



GETEC is met ruim 100 hectare het grootste industriepark in Noord-Nederland met bedrijven als DSM en BASF.

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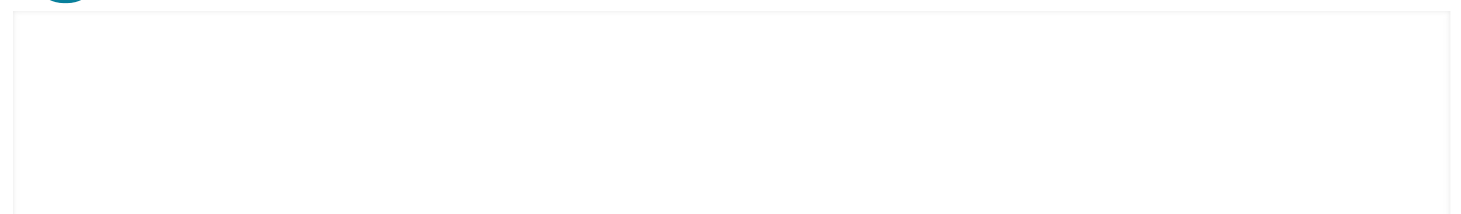
Rotterdam Botlek



De Botlek is een haven- en industriegebied in Rotterdam, gelegen ten westen van de Oude Maas tussen het Scheur en de A15.

3

Eemshaven





De Eemshaven is een overslaghaven, gelegen in de gemeente Het Hogeland in de provincie Groningen en is de grootste zeehaven van Noord-Nederland.

4

Pernis Rotterdam



De Eemhaven kenmerkt zich door containeroverslag, de Petroleumhavens worden gedomineerd door de petrochemische industrie met de olieraffinaderijen van Shell Pernis.

5

Chemelot site



Chemelot is een groot industriecomplex van 800 hectare voor de chemische industrie, gelegen rondom het knooppunt Kerensheide van de rijkswegen A2 en A76 tussen Stein en Geleen, in de Nederlandse provincie Limburg.

6

Chemiepark Delfzijl



Het Chemiepark Delfzijl is een geïntegreerd industrieterrein in de Oosterhoek van Delfzijl, dat is gebaseerd op zoutchemie.

7

Terneuzen



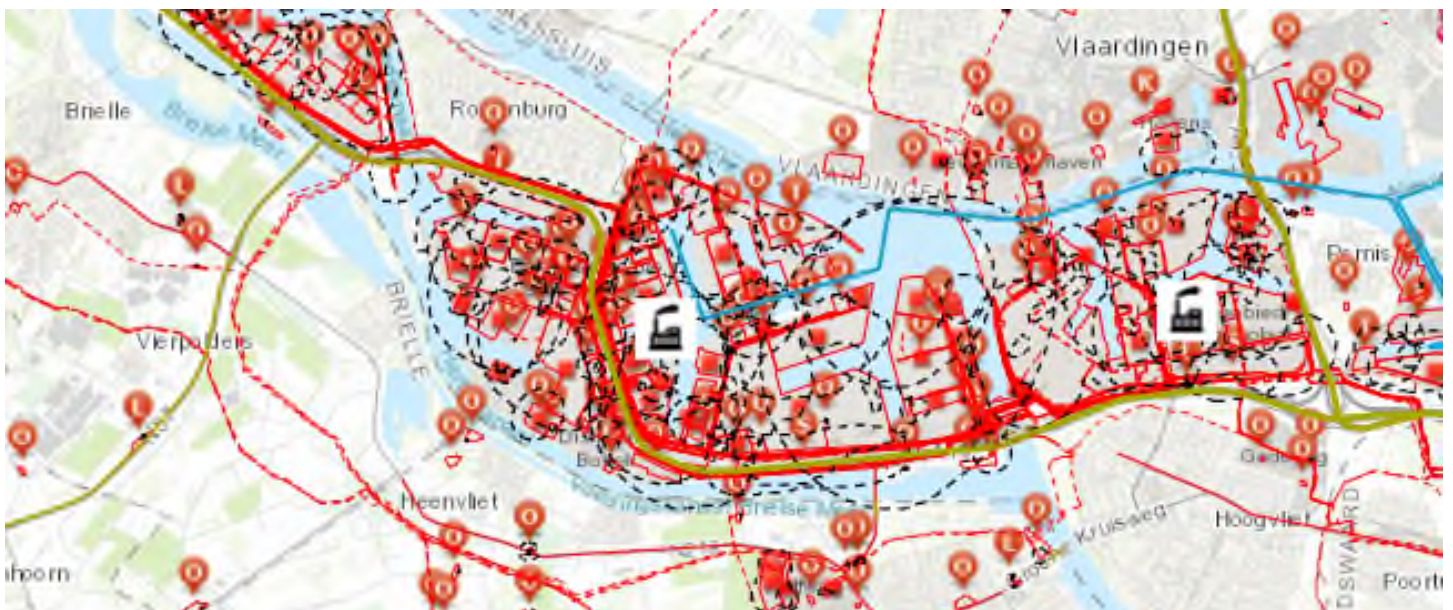
Het havengebied van Terneuzen is gelegen langs het Kanaal van Gent naar Terneuzen, een belangrijke binnenvaartverbinding. De havens in deze kanaalzone lopen helemaal door tot aan de Belgische grens, en verder.

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Vlissingen



Het havengebied van Vlissingen strekt zich uit tot Borsele en bestaat uit diverse insteekhavens.



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External hazards

Effects from neighbouring sites

What is the threat to my personnel and hazardous material carrying installations from neighbouring activities?

Threats to be taken into account:

- Fire,
- Explosions,
- Toxic releases.

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Climate factors

What parts of my site are subjected to **flood hazards**?

Possible issues:

- Loss of containment
- Power loss
- No aid from public services
- No export
- Foreign (chemical) deposits on site
- Undermining of installations
- Corrosion



Esri Nederland, Klimateffectatlas, Deltares

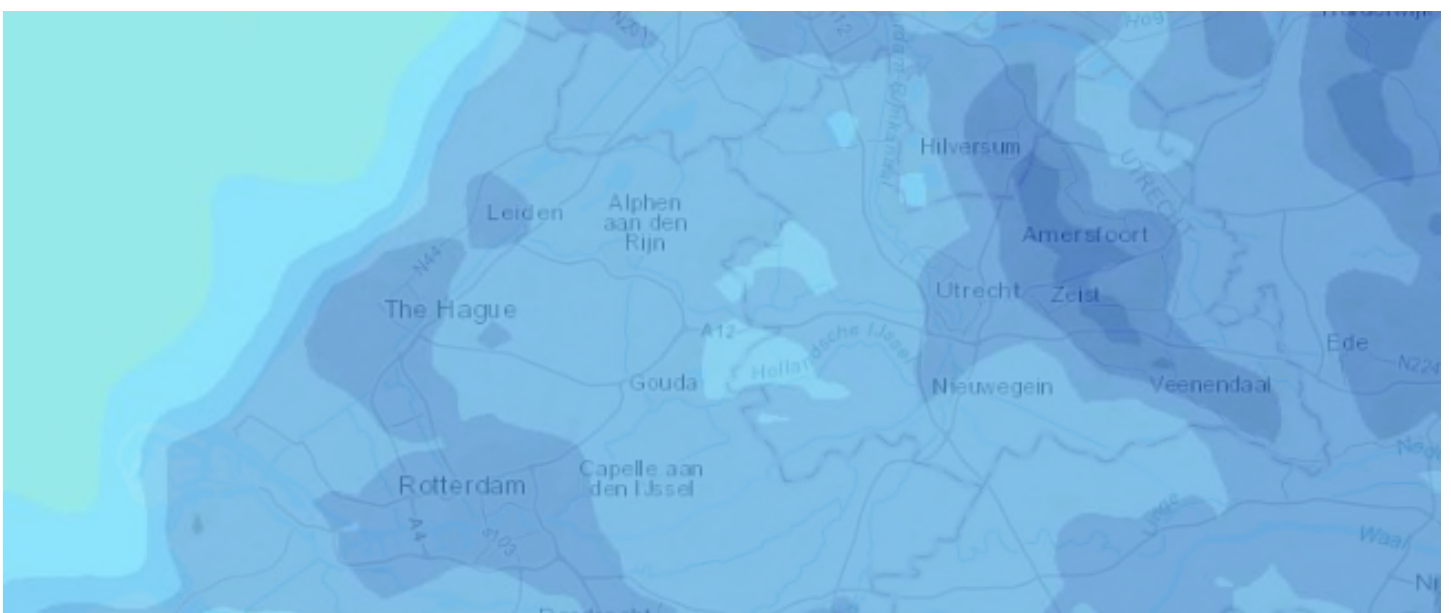
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Climate factors

What threats can be expected from **peak loads in downpours**?

Possible issues:

- Installation flooding
- Power loss
- Spillage & pollution
- Undermining of installations
- Roofs collapsing
- Roads & walkways not visible



Esri, HERE, Garmin, FAO, USGS, NGA | Esri Nederland, KNMI

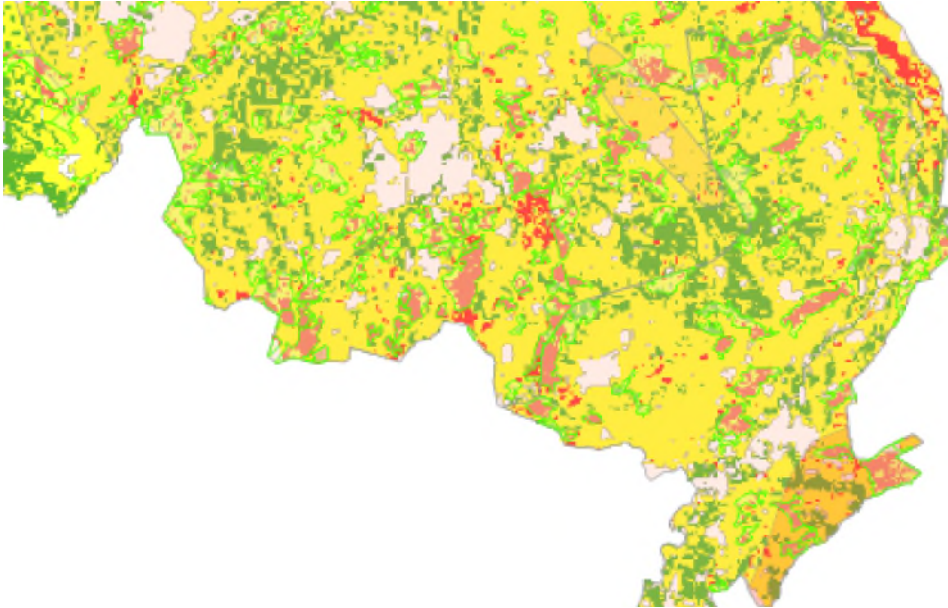
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Climate factors

What parts of my terrain are vulnerable to **storm damage**?

Possible issues:

- Insufficient effect from mitigational measures
- Injuries to personnel due to debris
- Damage from flying objects to installations
- No flare capacity
- Air pollution



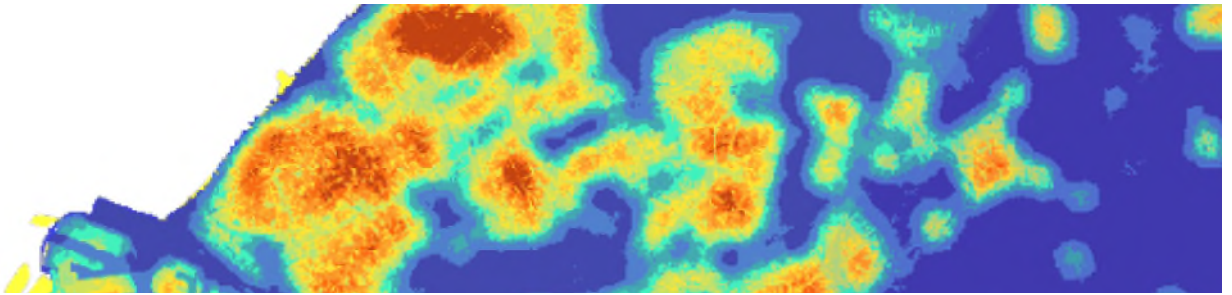
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Surrounding nature factors

What threat can be expected from **wild fires**? possible issues:

Possible issues:

- Fire hazard
- Power loss
- Polluted air intake
- Sparks in hazardous areas
- Safe housing of personnel



Esri Nederland, Klimateffectatlas, KNMI, CAS | Esri Nederland, Klimateffectatlas, Atlas Natuurlijk Kapitaal

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Climate factors

What threat can be expected from **sustained heat**?

Possible issues:

- No cooling capacity
- Heat stroke risk to personnel
- Storage above flashpoint
- Tarmac melting issues
- Power loss

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Climate factors

What threat can be expected from **sustained drought**?

Possible issues:

- Sparks ignite grass and weeds
- Ground cracking - failing soil protection
- Bund wall instability

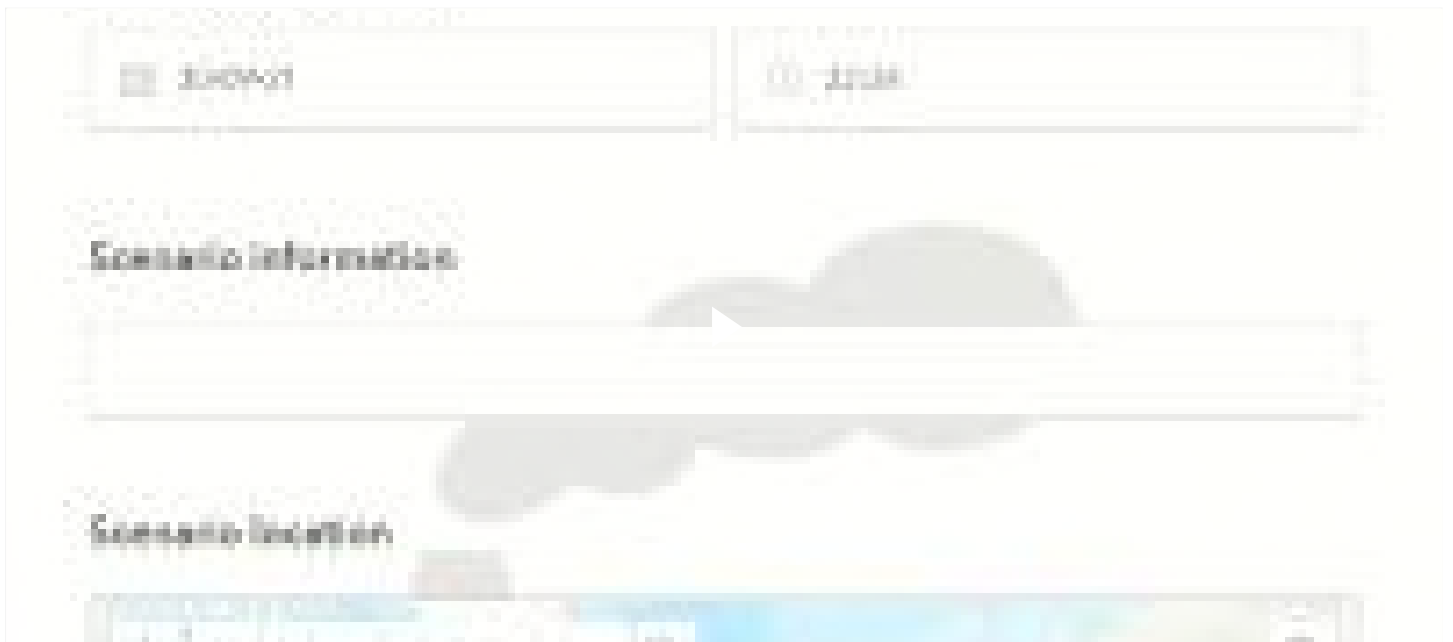
- Dust problems



Scenario effects

Localizing hazard sources (internal)

Identify and consider all potential internal exposures that may affect your site.



Localizing hazard sources (external)

Identify and consider all potential external exposures that

may affect your site.



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Potential scenario oversight

All scenarios in one map



Analyzing acquired data



Organisational

Internal Safety

All hazards ask for **contingency measures** protecting installations and personnel. Organise:

- fitting prevention policy,
- Safety management system,
- Safety report and
- Internal contingency plan.



Information Exchange

Information exchange include **more than only spatial planning and external safety**. Sites with domino effects should cooperate in **informing**:

- the public,
- other neighbouring sites
- and safety regions,

in order to enable proper **emergency response planning**.



Managing Safe housing

Building Risk Assessment

Optimize siting and layout and minimize risk of losses.

Hazard Management - Building assessment

Emergency contact person (if any)

Building no.

Building type

Subcategory

Occupied building

Yes

No

PSM critical

Yes

No

Date & time created

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The importance of modelling explosion regions

...or "why using external safety QRA models is not practicable".



The importance of modelling explosion regions

...or "why using external safety QRA models is not practicable".



Protective measures

- Emergency alarm in buildings
- Safe Shelters
- Ingress Protection
- Ventilation shutdown
- Protection from glass fragments

- Constructional protection
- Fire proofing



Visualisation and insight

Visualised and object based reporting helps keeping track of the current situation.

This is a Antea Group production

Vakgroep Save

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